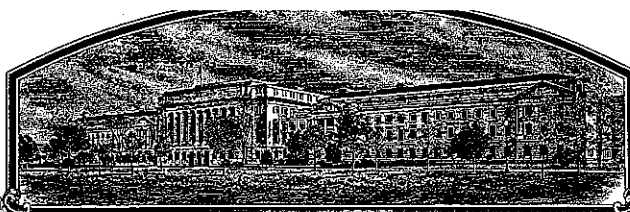


No.

9700147



# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

## Pennsylvania Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S), INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR PLANT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED, (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, 7 U.S.C. 2321 ET SEQ.)

BENTGRASS, CREEPING

'Penn G-1'



In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this eighth day of October, in the year two thousand and four.

Attest:

*[Signature]*  
Commissioner  
Plant Variety Protection Office  
Agricultural Marketing Service

*[Signature]*  
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

## APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER		3. VARIETY NAME	
Pennsylvania Agricultural Experiment Station		G-1		Penn G-1 Creeping Bentgrass RAD 8/19/2004	
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)		5. TELEPHONE (include area code)		FOR OFFICIAL USE ONLY	
0217 Agricultural Administration Building The Pennsylvania State University University Park, PA 16802		814/865-5410		VPPO NUMBER 9700147	
7. GENUS AND SPECIES NAME		8. FAMILY NAME (Botanical)		FILING AND EXAMINATION FEE:	
Agrostis palustris		Gramineae		FEE \$ 2,450. DATE 2/26/97	
9. CROP KIND NAME (Common name)		10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) (Common name)		CERTIFICATION FEE:	
Creeping Bentgrass		Land Grant University		FEE \$ 432.00 DATE 9/20/04	
11. IF INCORPORATED, GIVE STATE OF INCORPORATION		12. DATE OF INCORPORATION		14. TELEPHONE (include area code)	
				15. FAX (include area code)	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS		16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)			
Dr. Charles R. Krueger Associate Dean 0217 Agricultural Administration Building University Park, PA 16802		a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of the Variety d. <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Applicant's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,450), made payable to "Treasurer of the United States" (Mail to PVPO)		RAD 11/12/04	
17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? (See Section 23(a) of the Plant Variety Protection Act)		18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?		19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?	
<input checked="" type="checkbox"/> YES (If "yes," answer items 18 and 19 below)		<input type="checkbox"/> NO (If "no," go to item 20)		<input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED	
20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRIES?		21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.			
RAD 04/20/01 9/9/96 <input checked="" type="checkbox"/> YES (If "yes," give names of countries and dates)		<input checked="" type="checkbox"/> NO		Released, but not commercially sold	
21. The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.		Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.			
SIGNATURE OF APPLICANT (Owner(s))		SIGNATURE OF APPLICANT (Owner(s))			
NAME (Please print or type)		NAME (Please print or type)			
Charles R. Krueger					
CAPACITY OR TITLE		DATE		CAPACITY OR TITLE	
Associate Dean		2/21/97			

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Attachment for Application Item 20.

	PSU Release <sup>1</sup>	PSU PVP Application <sup>2</sup>	PVP Application Date <sup>3</sup>	First Commercial Sale
Penn A-1	08-29-95	10-17-96	11-26-96	11-30-95
Penn A-2	08-29-95	10-17-96	12-19-96	02-27-96
Penn A-4	08-29-95	10-17-96	12-19-96	01-24-96
<b>Penn G-1</b>	<b>08-29-95</b>	<b>02-21-97</b>	<b>02-26-97</b>	<b>05-20-96</b>
Penn G-2	08-29-95	10-17-96	12-12-96	01-10-96
Penn G-6	08-29-95	10-17-96	01-02-97	01-24-96
Seaside II	08-29-95	10-17-96	12-12-96	01-26-96

<sup>1</sup>PSU Release - Date Pennsylvania Experiment Station Seed Committee approved variety release

<sup>2</sup>PSU PVP Application - Date on PSU PVP application form

<sup>3</sup>PVP Application - Application date of variety by PVP office as listed in PVP Official Journal, Vol. 25, December 1997

## **Penn G-1**

### **Origin and Breeding History of Penn A-1, A-2, A-4, G-1, G-2, G-6**

The objective of this varietal breeding program was to develop creeping bentgrasses exhibiting superior putting green turf over existing varieties. Original parental material was selected from segregated patches of bent, 12 to 18 inches in diameter, on some greens at the Augusta National Golf Club, Augusta, Georgia in the spring of 1984. These segregates attracted attention because they were vigorous and dense, very fine textured, and had a more upright growth habit of individual plant tillers. The growth habit was unique because the selected segregates did not spike (raise up) from golfer's metal-spiked golf shoes. Their ability to spread at a closer than normal height of cut used for fast greens was also indicative of potential heat tolerance in a hot, humid golf course environment. The value of non-spiking features was proven in subsequent years by the banning of golf shoes with metal spikes on most American golf courses, except for professional tournaments.

There were two groups of selections by the breeder, the 'G' and 'A' series. There were eight 'G' selections (G-1 to G-8) from two greens on the Par 3 course originally seeded to Penneagle creeping bent, and six selections (A-1 to A-6) from four greens on the main course originally seeded to Penncross creeping bent.

The breeding method used was a polycross procedure. The single parent selection of Penn G-1 was crossed with experimental selections of Penn A followed by two generations of crossing selected sib plants of Penn G-1.

Both 'G' and 'A' series selections were cloned into eight plants, pot planted, and induced to flower in growth chambers for six weeks. Isolated crossing blocks were established in the greenhouse for each 'G' and 'A' line in December 1984. Due to near self-sterility of bent, 'A' line plants were used as male crossing parents for 'G' lines, and conversely, 'G' plants used as male parents for the 'A' lines. Seed was produced from all crosses in March. Next 250 plants from bulk seed of each 14 lines (G-1, G-2, G-3, G-4, G-5, G-6, G-7, G-8 and A-1, A-2, A-3, A-4, A-5, and A-6) were nursery space planted in isolated field blocks in August 1985.

The first cycle of reselection began in the spring of 1986. First plants to be chemically rogued were those lacking in vigor coming out of winter. Majority of plants had a more upright growth with short stolons in keeping with their putting green selections. There were a few semi-decumbent types with longer stolons and dense ball types. The emphasis was on selecting the most uniform in upright growth habit, vigor, and uniformity in pre-anthesis flowering. On this basis, 30 to 50 plants were selected from each block of A-1, A-2, A-4, G-1, G-2, and G-6. All other 'A' and 'G' lines were discarded due to a combination of segregation and lack of vigor uniformity.

Seed was harvested from selected lines (G-1, G-2, G-6, A-1, A-2, and A-4) and used for small turf plots which confirmed the fine, dense qualities of original parents. The

selected clones of the first cycle were pot planted, cloned, and again induced to flower in growth chambers to save a year. Plants of each line were in isolated greenhouse crossing blocks. Crossing in this cycle was confined to the siblings of each line with no other pollen source. From the crossed plants of each line, 300 seedlings were grown for field planting for the next cycle of reselection in 1987.

The second cycle of reselection in 1987 consisted of arbitrarily selecting 40 to 50 plants as a reasonable number to work with and with the main criterion of selecting an upright growth habit eliminating all but very short stolon types, uniformity of size and vigor, and flowering. Confining the pollen source in this crossing within the G-1 parents resulted in increasing the population of desired growth habit types and reducing the longer stolon types to a few. Most of the "off-types" were limited to the dense ball types with few flowering heads.

Forty clones of each G and A were recloned to three plants and sent to Oregon for further evaluation and reselection under production state conditions where growth is more robust than in Pennsylvania and where commercial production would eventually take place. Following observations, 20 clones each were selected as potential Breeders parents. Seed of each G and A line was used to plant half acre observation, seed yields, and management trials. Satisfactory uniformity and stability of the G and A bent varieties from Oregon grown first generation seed was ascertained by inspection in both the vegetative and flowering stages of growth by the breeder, pure seed testing personnel, and Oregon certification. Variants consisted of a few more spreading decumbent types and the non-spreading ball types. The decumbent type seed heads protrude laterally at plant perimeters and the ball types produce few or no flowers. The decumbent variants for G-1 were calculated to constitute 0.02% based on 29 plants per half acre of an estimated population of 39,000 plants.

By agreement with the Bentgrass Growers Association with proprietary rights, all observed variants shall be chemically rogued to maintain varietal purity and stability in order to maintain a certified stand life of five seed yield years. To further maintain varietal purity, the commercial production of Penn G and A bents shall be limited to a two generation system, Breeder and Certified; the only varieties limited to only two generations.

Three cycles of five year stands of commercial plantings have shown that Penn G-1 is a uniform and stable variety to the satisfaction of the breeder and Oregon Certification with no further reselection deemed necessary.

Breeder seeds of Penn G-1 has been maintained and produced by Pure Seed Testing in Hubbard Oregon since 1994. Approval of the variety name has been cleared by the Seed Branch on May 21, 2003.

### Variety Distinction of Penn G-1

A PVP nursery was established at University Park, Pennsylvania in 1994 consisting of 21 creeping bent varieties with three replications of 25 spaced plants. Included were Penn G-1, plus six new Penn State varietal releases Penn G-2, G-6, A-1, A-2, A-4, Seaside II, and 13 commercial varieties. Data were collected in 1995 as shown in Table 1. This nursery was discarded due to loss of land.

A second PVP nursery was established at the Pure Seed Testing Research Farm near Hubbard, Oregon in 1995. The purpose was to evaluate plants in the location of major bentgrass commercial production where growth greatly exceeds the environment in the Northeast. It consisted of the above experimentals and 12 commercial varieties with four replications of 25 spaced plants. This test was maintained and data collected and analyzed by Pure Seed personnel after the original application for PVP. These data are shown in Tables 2 and 3. Varieties significantly different by years from Penn G-1 are summarized in Table 4. In this form, the most obvious differences and similarities are easily discerned.

Penn G-1 may be most easily distinguished from other bentgrass varieties tested predominately by plant height, base spread, panicle length, and flag leaf length based on morphological characters measured in three years of testing. It is most similar to Pennlinks and be distinguished by the following:

<u>Characteristic</u>	<u>Penn G-1</u>	<u>vs</u>	<u>Pennlinks</u>
Ligule margins	Toothed		Entire
Basal hair number	Absent		Few
Panicle type	Compact		Open
Panicle branch in anthesis	Appressed		Ascending

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Exhibit C  
(Revised)

U.S. Department of Agriculture  
Agricultural Marketing Service  
Science Division  
Beltsville, Maryland 20705

OBJECTIVE DESCRIPTION OF VARIETY  
BENTGRASS (Agrostis spp.)

Name of Applicant(s) Pennsylvania Agricultural Experiment Station	Variety Name or Temporary Designation Penn G-1 <del>(G-1)</del> Rad 8/19/64
Address (Street and No. or R.F.D. No, City, & ZIP Code) 0217 Agricultural Administration Bldg. The Pennsylvania State University University Park, PA 16802	FOR OFFICIAL USE ONLY PVPO Number

Place numbers in the boxes (e.g. ) for the characters that best describe typical plants of this variety. The symbol  $\Delta$  indicates decimal.

COMPARISON VARIETIES FOR USE BELOW

1- Astoria 2- Exeter 3- Highland 4- Seaside 5- Penncross 6- Kingstown  
7- Astra 8- Other Pennlinks 9-Southshore 10-Penneagle

1. SPECIES:

☒ 1- Colonial (browntop) A. tenuis 2- Creeping A. stolonifera (A. palustris)  
3- Velvet A. canina ssp. canina 4- Brown bent A. canina ssp. montana  
5- Red top A. gigantea

2. ADAPTATION: (0= Not Tested, 1= Not Adapted, 2= Adapted)

☐ Northeast ☐ Southeast ☐ North Central ☐ Pacific N. W.  
☐ Other (Specify) \_\_\_\_\_

3. MATURITY (At first anthesis): Use comparison varieties

Days earlier than , Maturity same as ,  Days later than

4. HEIGHT (Average of longest 10 shoots from soil surface to top of head):

<input type="text" value="4"/> <input type="text" value="8"/> Cm Height (at maturity)	<input type="text" value="0"/> <input type="text" value="7"/> Cm Shorter than <input type="text" value="4"/>	} Comparison Variety
	Height same as <input type="text" value="9"/>	
	<input type="text" value="0"/> <input type="text" value="6"/> Cm Taller than <input type="text" value="8"/>	

5. GROWTH HABIT:

% Prostrate ☒  % Decumbent  % Geniculate  % Erect

## 6. VEGETATIVE REPRODUCTION:

☒ Rhizomes 1- Absent 2- Present☐ Stolons 1- Absent 2- Present☐☐☐ % Rhizomes☐☐☐☐ % short stolons

## 7. LEAF BLADE:

☒ Color: 1- Yellowish Green (Cohansey)  
3- Green (Exeter)  
5- Bluish Green (Highland)2- Light Green (Washington)  
4- Dark Green (Kingstown, Tracenta)  
6- Other (Specify) \_\_\_\_\_☒ Texture: (fineness)1- Very fine (Kingstown)  
3- Medium fine (Astoria)  
5- Medium coarse (Virginia)2- Fine (Exeter)  
4- Medium (Seaside)  
6- Coarse (Vermont)☐☐☐☐ Stomatal density upper leaf surface (Number/mm<sup>2</sup>)Lower Surface: ☐☐☐ % Smooth ☐☐☐ % RoughUpper Surface: ☐☐☐ % Smooth ☐☐☐ % RoughMargins: ☐☐☐ % Smooth ☐☐☐ % Rough☐☐ Mm Width (Average of 10)☐☐ Mm Narrower than ☐Width same as ☐☐☐ Mm Wider than ☐

Comparison

Variety

☒☒ Mm Width (Flag leaves)☒☒ Cm Length (Flag leaves)

## 8. LEAF SHEATH:

☒ Anthocyanin: 1- Absent 2- Present☐☐☐ % Red sheaths

## 9. LIGULE (Lower and middle leaves):

Shape at Apex: ☐☐☐☐ % Acute ☐☐☐☐ % Rounded ☐☐☐☐ % Truncate☐☐☐ % Other (Specify) \_\_\_\_\_Pubescence: ☐☐☐☐☐ % Glabrous ☐☐☐ % PubescentMargins: ☐☐☐☐ % Entire ☐☐☐☐ % Toothed☐☐☐ % Other (Specify) \_\_\_\_\_☐☐ Mm Length

## 10. LEMMA:

Shape: ☐☐☐ % Lanceolate ☐☐☐ % Ovale ☐☐☐ % Obovate  
☐☐☐ % Elliptic ☐☐☐ % Oblong ☐☐☐ % Other (Specify) \_\_\_\_\_

☐☐☐ Mm Width ☐☐☐ Mm Length (exclusive of awn)

Color: ☐☐☐ % Buff ☐☐☐ % Silvery ☐☐☐ % Other (Specify) \_\_\_\_\_

Surface: ☐☐☐ % Glossy ☐☐☐ % Dull

Texture: ☐☐☐ % Smooth ☐☐☐ % Punctate

Pubescence: ☐☐☐ % Glabrous ☐☐☐ % Sparse ☐☐☐ % Copious

Basal Hairs: ☐☐☐ % Absent ☐☐☐ % Few ☐☐☐ % Many

☐☐☐ % Short ☐☐☐ % Long

☐☐☐ % Appressed ☐☐☐ % Ascending ☐☐☐ % Spreading

Awns: ☐☐☐ % Absent ☐☐☐ % Few ☐☐☐ % Many

☐☐☐ % Awn-pointed ☐☐☐ % Short ☐☐☐ % Long

☐☐☐ % Straight ☐☐☐ % Geniculate

Awn Insertion on Lemma:

☐☐☐ % Basal ☐☐☐ % Middle ☐☐☐ % Distal

## 11. PANICLE:

Type (in anthesis): ☐☐☐ % Open ☐☐☐ % Compact

Anthocyanin: ☐☐☐ % Absent ☐☐☐ % Present

Branches in Anthesis: ☐☐☐ % Appressed ☐☐☐ % Ascending ☐☐☐ % Spreading

Branches in Fruit: ☐☐☐ % Appressed ☐☐☐ % Ascending ☐☐☐ % Spreading

Branch Surface: ☐☐☐ % Smooth ☐☐☐ % Scabrous

## 12. SEED:

☐☐☐ Grams per 1000 seed

## 13. SPRING GREEN UP:

☐ 1- Early (Exeter) 2- Medium (Astoria) 3- Late (Kingstown)

Bentgrass - 4 -

14. ENVIRONMENTAL RESISTANCE: (0= Not tested, 1= Susceptible 2= Resistant)

☒ Cold ☒ Heat ☐ Drought ☐ Shade ☐ Other (Specify) \_\_\_\_\_

15. DISEASE RESISTANCE (0= Not tested 1= Susceptible 2= Resistant):

☒ Red Leaf Spot - *Drechslera erythrospila* ☐ Helminthosporium Leaf Spot  
(*Bipolaris sorokiniana*)  
☐ Melting Out - *Drechslera poae* ☒ Dollar Spot - (*Sclerotinia homoeocarpa*)  
(*Helminthosporium vagans*)  
☐ Pythium Blight - (*P. aphanidermatum*) ☒ Pythium Blight (*P. ultimum*)  
☐ Fusarium Blight (*F. roseum*) ☐ Fusarium Blight (*F. tricinctum*)  
☒ Fusarium Patch (Pink Snow Mold)  
(*F. nivale*) ☐ Powdery Mildew (*Erysiphe graminis*)  
☐ Ophiobolus Patch (*O. graminis*) ☐ Stripe Smut (*Ustilago striiformis*)  
☐ Copper Spot (*Gloeocercospora sorghi*) ☐ Typhula Blight (Snow Scald)  
(*T. incarnata*) ☒ Brown Patch (*Rhizoctonia solani*)  
☐ Red Thread (*Corticium fuciforme*) ☐ Crown Rust (*P. coronata*)  
☐ Stem Rust (*Puccinia graminis*) ☐ Other \_\_\_\_\_  
☒ Leaf Rust (*P. poae-nemoralis*)

16. INSECT RESISTANCE (0= Not tested, 1= Susceptible, 2= Resistant):

☐ European Chafer ☐ Garden Chafer  
(*Amphimallon solstitialis*) (*Phyllopertha horticola*)  
☐ Chinch Bug (*Blissus insularis*) ☐ Webworm (*Crambus* spp.)  
☐ Armyworm (Cutworm) ☐ Other \_\_\_\_\_  
(*Pseudaletia unipuncta*)

17. GIVE VARIETY(S) THAT MOST CLOSELY RESEMBLE THE SUBMITTED VARIETY: For the following characteristics indicate degree of resemblance (D.R.) with one of the following numbers: 1= Submitted variety is less than, lighter, or inferior to similar variety, 2= Same as, 3= More than, darker or superior, etc.

Character	Similar Variety	D.R.	Character	Similar Variety	D.R.
Growth Habit	Pennlinks	3	Leaf Color	Pennlinks	2
Awn Length			Panicle Type	Pennlinks	2
Seed Weight			Turf Fineness	Pennlinks	3
Cold Resistance	Pennlinks	2	Heat Resistance	Pennlinks	3
Drought Resistance			Shade Resistance		
Brown Patch	Pennlinks	3	Moss Resistance	Pennlinks	3

18. COMMENTS:

Table 1. Morphological Character Measurements<sup>1</sup> 1995

Plant Height (cm)	Base Spread (cm)	Panicle Length (cm)	Flag Leaf Length (cm)	Flag Leaf Width (mm)	# Bottom Whorl Branches
Seaside	Penn G-1 32.0	Seaside	5.5	Seaside	5.0
Seaside II	Penn A-1 33.0	Cobra	5.3	Putter	4.7
Penn G-1 36.0	Penn A-4 34.0	Seaside II	5.2	Regent	4.5
Penn G-2 34.3	Penn A-2 35.0	Penn A-1	4.8	Penn A-1	4.5
Penn G-2 34.3	Penn G-2 36.0	Penn A-2	4.8	Southshore	4.5
Penn G-2 34.1	Penn G-6 36.0	Procup	4.7	Penn A-4	4.3
Penn G-2 34.0	Penn G-6 41.0	Regent	4.5	Penn G-2	4.2
Penn A-4 33.7	Cato 44.0	Penn G-2	4.5	Lopez	4.2
Penn A-4 33.2	Crenshaw 45.0	Penn G-2	4.4	Cato	4.1
Southshore 33.1	Providence 47.0	Penn G-1	4.4	Penn G-1	4.0
Regent 32.8	Lopez 47.0	Southshore	4.4	Penn A-2	4.0
SR 1020 32.8	Penn G-1 48.0	Penn A-4	4.3	SR 1020	4.0
Crenshaw 31.5	Procup 51.0	Regent	4.3	Penn G-1	4.0
Procup 31.1	Putter 55.0	Providence	4.3	Seaside II	3.9
Lopez 30.7	Regent 62.0	Penn G-1	4.2	Cobra	3.9
Cato 30.3	Southshore 64.0	Putter	4.1	Penn G-1	3.8
Providence 29.8	Cobra 65.0	Crenshaw	4.1	Penn A-4	3.8
Penn A-1 29.7	SR 1020 69.0	Penn G-2	4.1	SR 1020	3.7
Penn A-2 29.5	Seaside II 72.0	Penn G-1	4.0	Cato	3.6
Penn G-6 28.4	Penn G-6 80.0	Penn G-6	3.6	Penn G-6	3.6
	Seaside 82.0	Penn A-2	5.5	Procup	3.6
LSD (0.05)	2.1	9.1	0.5	0.3	0.6

<sup>1</sup>Penn State University Breeding Nursery, University Park, PA. Three replications of 25 space plants each.

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Table 2. Morphological Character Measurements<sup>1</sup> 1996

	Plant Height (cm)	Panicle Length (cm)	Flag Leaf Length (cm)	Flag Leaf Width (mm)	# Bottom Whorl Branches
Seaside II	63.8	Penn A-1	<b>Penn G-1</b> 9.25	4.80	Penn A-1 7.3
Seaside	63.1	Seaside	Seaside II 9.03	4.57	Penn A-2 7.0
Penn A-1	62.5	Southshore	Seaside 8.90	4.53	Procup 7.0
Southshore	60.2	Crenshaw	Regent 8.47	4.52	Crenshaw 6.7
Penn G-2	57.1	Cato	Procup 8.26	4.45	Lopez 6.6
Crenshaw	54.1	<b>Penn G-1</b> 11.7	Penn A-1 7.98	4.40	Putter 6.4
Providence	53.1	Penn G-6	Putter 7.91	4.37	Penneagle 6.4
<b>Penn G-1</b> 53.0		Seaside II	Penn G-6 7.82	4.32	Pennlinks 6.4
Penn A-2	52.2	Penn A-4	Cato 7.78	4.17	Penn G-6 6.3
Regent	51.4	Penn G-2	Penn A-2 7.73	4.17	Penncross 6.3
Putter	49.9	Putter	Crenshaw 7.48	3.95	Providence 6.3
Lopez	47.5	Pennlinks	Penn G-2 7.43	3.83	SR 1020 6.0
Penn A-4	46.7	Regent	Lopez 7.13	3.82	Cato 5.8
Penneagle	46.0	Penneagle	Penncross 7.06	3.77	Penn G-2 5.6
SR 1020	44.3	Procup	Southshore 7.06	3.75	Regent 5.6
Procup	44.3	Lopez	Penneagle 6.87	3.62	<b>Penn G-1</b> 5.6
Penn G-6	43.2	Providence	SR 1020 6.86	3.43	Southshore 5.5
Penncross	43.2	SR 1020	<b>Penn G-1</b> 2.83	2.83	Seaside II 5.4
Cato	42.3	Penncross	Providence 6.50	2.58	Seaside 4.8
Pennlinks	37.8	Penn A-2	Penn A-4 5.90	2.38	Penn A-4 4.6
LSD (0.05)	5.2	0.67	1.56	0.96	0.93

<sup>1</sup>Pure Seed Testing Research Farm, Hubbard, Oregon. Four replications of 25 space plants each.

Table 3. Morphological Character Measurements<sup>1</sup> 1997

	Plant Height (cm)	Panicle Length (cm)	Flag Leaf Length (cm)	Flag Leaf Width (mm)	# Bottom Whorl Branches
Seaside	63.2	Seaside	7.58	4.50	5.18
Penneagle	59.4	Pennlinks	7.05	4.27	4.95
<b>Penn G-1</b>	<b>55.9</b>	Penneagle	7.00	3.35	4.95
Seaside II	54.6	Crenshaw	6.98	3.30	<b>Penn G-1</b>
Pennlinks	53.9	Providence	6.97	3.23	Seaside II
Lopez	53.6	Seaside II	6.72	<b>Penn G-1</b>	Lopez
Penn A-4	53.5	Southshore	6.68	3.00	Penn A-2
Penn A-2	53.4	SR 1020	6.55	2.95	Providence
Penn A-1	53.0	Regent	6.40	2.93	Southshore
Penn G-2	52.7	Cato	<b>6.04</b>	2.82	Crenshaw
Southshore	52.2	Penncross	5.77	2.82	Pennlinks
Regent	51.6	<b>Penn G-1</b>	5.71	2.73	SR 1020
Providence	50.1	Penn G-2	5.26	2.70	Regent
SR 1020	49.8	Penn A-2	4.87	2.70	Seaside
Cato	49.4	Penn A-1	4.82	2.67	Penn G-2
Putter	49.1	Putter	4.55	2.58	Cato
Penn G-6	47.6	Lopez	4.35	2.58	Penn A-4
Penncross	47.4	Penn A-4	4.29	2.45	Penn A-1
Procup	46.8	Procup	3.97	2.40	Penn G-6
Crenshaw	46.3	Penn G-6	3.83	2.37	Procup
LSD (0.05)	2.9	0.75	0.54	0.30	0.59

<sup>1</sup>Pure Seed Testing Research Farm, Hubbard, Oregon. Second Year Test.

Table 4. Varieties Significantly different from Penn G-1 for Listed Years 1995, 1996, 1997.

Variety	Plant Height	Vegetative Base Spread	Panicle Length	Flag Leaf Length	Flag Leaf Width	# Lower Whorl Branches	Total Years
Penn A-1	95 96		96	95 97	96	95 96 97	9
Penn A-2	95		96	95 97		96	5
Penn A-4	95 96		97	96 97		96 97	7
Penn G-2	97			96 97	96 97		5
Penn G-6	95 96 97		97	95 97	96 97	97	9
Seaside II	96	95	95	95 97	96 97		7
Seaside	95 96 97	95	95 96 97	95 97	95 97	95	12
Penncross	97	95	95 96 97	95 96	96	95	9
Penn eagle	96	95	95 96 97	96	97		7
Pennlinks			95 96 97	96 97	96		6
Putter	95 97	95	95 97	97		95	7
Southshore	95 96 97	95	95 96	96 97	96 97		10
Regent	97	95	95 96	97	97		6
SR 1020	95 97	95	95 96	96	96 97		8
Crenshaw	95 97	95	97	96 97	96 97	95 96	10
ProCup	95 97	95	95 96 97	97	95 96	95 96 97	12
Lopez	95 96	95	96	96 97	96	96	8
Providence	95 97	95	96	96 97	96 97		8
Cato	95 97	95			96 97	97	6
Total Years	33	13	31	31	26	17	

### **Additional Description of Penn G-1**

Penn G-1 is very similar to Cato in space planted morphological characters. It exhibited improved qualities in putting green management trials as follows:

Leaf texture (width) for two years, 0.65 and 0.69 mm vs 0.80 and 0.84, and 0.68 vs 0.80 (Table 5).

Shoot density/dm<sup>2</sup> for two years 1881 and 1996 vs 1254 and 1287 (Table 6).

Turf density for three years in Florida (Table 7).

Turf quality ratings in Georgia for four years (Table 8).

Tuft quality and other ratings in Illinois (Table 9).

Turf quality and other ratings in Alabama (Table 10).

Turf quality and other ratings in New York (Table 11).

Winter purple color ratings average for two years in Georgia (Table 12).

Table 5. Leaf texture<sup>1</sup> of putting green bent maintained at 4.0 mm as putting green turf in three locations.

	University Park, PA		Augusta, GA		Turin, Italy	
	1993	1999		1993		1992
Penn G-2	0.61	0.73	Penn A-2	0.63	Penn G-2	0.63
Penn G-6	0.63	0.73	Penn A-1	0.65	Penn G-6	0.70
Penn A-1	0.63	0.75	Penn G-2	0.65	Penn A-1	0.70
FHG-1	0.63		Penn G-1	0.68	Penn G-1	0.72
Penn G-1	0.65	0.69	Penn A-4	0.69	Seaside II	0.79
Penn A-2	0.67	0.71	Penn G-6	0.71	Pennlinks	0.80
Penn A-4	0.69	0.76	Crenshaw	0.79	SR-1020	0.84
Seaside II	0.74	0.76	Cato	0.80	Southshore	0.85
Pennlinks	0.77	0.93	Seaside II	0.80	Penncross	0.85
Cato	0.80	0.84	Penncross	0.99	Providence	0.86
SR-1020	0.80	0.84			Putter	0.88
Providence	0.81	0.96			Cobra	0.90
Penneagle	0.85	0.95			National	0.90
Putter	0.89				Seaside	0.90
Carmen	0.93				Penneagle	0.95
Cobra	0.95				Emerald	0.96
Penncross	0.99	0.99				
Seaside	1.01	0.99				
Emerald	1.12					
LSD (0.05)	0.04	0.09		0.06		0.10

<sup>1</sup>Leaf width of second sub-tended leaf (mm).

Table 6 Bentgrass shoot density/dm<sup>2</sup>, Augusta, GA, and Turin, Italy.

	Augusta, GA			Turin, Italy	
	1992	1993		1992	1993
PENN A-2	2376	2392	PENN G-1	1574	2612
PENN A-1	1815	2145	PENN G-2	1080	2546
PENN G-1	1881	1996	PENN G-6	1065	2378
PENN G-2	2079	1963	PENN A-1	1075	2240
PENN A-4	1617	1917	Seaside II	1043	2058
PENN G-6	1683	1838	Southshore	—	1509
Crenshaw	1617	1419	Pennlinks	1000	1504
Cato	1254	1287	Providence	914	1425
Penncross	1122	1270	SR 1020	1017	1419
Seaside II	1419	1056	Putter	1091	1272
			Penneagle	980	1241
			Cobra	1170	1196
			National	908	1013
			Emerald	915	1010
			Seaside	591	765
LSD (.05)	180	214		258	178

Table 7 Loxahatchee Country Club, West Palm Beach, FL. 1991 Bent Test.

	Density 1 to 9, 9 = best				Pythium
	92	93	94	Ave.	92
PSU G-2	8.5	7.7	7.3	7.8	5.7
PSU A-1	7.8	7.3	7.5	7.5	5.7
PSU G-6	7.3	7.6	7.6	7.5	6.0
PSU A-2	7.9	7.4	6.8	7.4	5.7
PSU A-4	6.5	7.4	7.2	7.1	5.7
Crenshaw	7.3	6.4	6.5	6.7	4.3
Seaside II	7.3	6.2	6.5	6.7	3.7
PSU G-1	8.3	7.3	6.3	6.6	5.3
Cato	6.3	5.9	6.5	6.2	5.7
Pennlinks	5.9	6.6	5.4	6.0	6.0
SR 1020	5.9	6.6	5.3	6.0	4.7
Providence	5.1	6.3	5.9	5.8	7.7
Syn-1	4.7	4.3	5.2	4.7	4.0
Penncross	4.4	4.6	4.5	4.5	5.3
LSD (.05)	0.4	0.5	0.5	0.4	

Modified sand-peat soil. Maintained same as course greens. Routine fungicides and insecticides.  
Ht of cut: 1/8 to 3/16 (winter to summer).

Table 8. Augusta National Golf Club, 1991 Nursery Text

	Quality 1 to 9.9 = best							
	<u>Jul-92</u>	<u>Oct-92</u>	<u>Feb-93</u>	<u>Apr-93</u>	<u>Jul-93</u>	<u>Jan-94</u>	<u>Jul-94</u>	<u>Aug-94</u>
PSU G-2	8.0	8.5	8.0	8.5	8.0	8.5	8.2	8.0
PSU A-1	7.0	8.0	8.0	8.2	8.0	8.2	8.0	8.7
PSU G-1	7.0	7.0	8.2	8.2	8.2	9.0	8.5	7.7
PSU 1-4	8.0	7.0	7.8	8.5	8.0	8.5	8.0	8.5
PSU 1-2	7.0	8.0	8.2	8.5	8.2	7.2	7.7	8.5
PSU G-6	7.0	7.5	7.5	7.7	7.5	6.0	7.5	7.5
Cato	6.0	6.0	6.5	6.5	6.5	6.2	6.0	7.0
Crenshaw	6.0	6.0	6.5	7.0	6.5	6.0	5.5	6.7
PSU DF-1	6.0	6.0	6.0	5.0	4.0	6.5	5.5	6.0
Pennecross	5.0	5.0	4.0	4.5	6.0	3.0	4.5	5.0
LSD (0.05)	0.7	0.6	1.1	1.2	0.9	1.1	1.0	0.8

Nursery maintained same as course greens. Ht of cut from 1/8 to 5/32. Preventive disease control. Ratings 1

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Table 9

MEAN TURFGRASS QUALITY AND OTHER RATINGS OF BENTGRASS CULTIVARS  
IN THE 1997 USGA/GCSAA/NTEP ON-SITE BENTGRASS TEST  
AT GLENVIEW, IL (NORTH SHORE COUNTRY CLUB) 1/  
1998 DATA

TURFGRASS QUALITY AND OTHER RATINGS 1-9; 9=BEST  
TURFGRASS STIMPMETER READINGS MEASURED IN INCHES 2/

NAME	GENETIC COLOR	GREENUP	LEAF TEXTURE	SEEDLING VIGOR	DENSITY FALL	STIMPMETER READINGS				QUALITY RATINGS						
						JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	MAY	JUN	JUL	AUG	SEP	OCT
PENN A-4	5.0	7.0	8.0	4.3	8.3	91.0	95.3	101.7	106.7	111.7	8.7	8.0	7.7	7.7	6.7	8.0
CENTURY	5.0	6.3	8.7	4.7	8.3	92.0	95.7	98.3	101.3	107.3	8.0	7.3	7.3	8.0	7.3	7.6
PENN A-1	5.3	7.7	8.7	4.7	8.0	88.0	91.0	98.7	103.3	113.3	7.7	7.3	7.7	7.3	7.0	8.0
BACKSPIN	4.3	6.7	7.7	5.0	8.0	88.7	93.7	97.3	102.3	107.7	6.7	6.7	7.3	8.0	7.0	8.0
SR 1119	6.0	6.7	7.3	3.7	7.3	89.7	97.0	99.7	108.0	117.7	7.0	7.0	7.3	8.0	7.3	7.3
IMPERIAL	5.3	7.0	8.0	5.0	7.7	91.3	99.0	98.7	103.0	113.7	6.7	6.0	7.3	7.3	8.0	7.7
L-93	5.3	7.3	7.0	5.0	7.7	95.7	99.3	98.3	104.0	108.7	6.7	6.7	7.0	7.3	7.7	7.2
PENN G-1	5.3	6.3	8.0	4.7	8.7	93.3	96.3	99.0	105.0	109.0	7.3	6.7	7.3	7.0	7.3	7.7
PENN G-6	5.3	7.0	7.7	3.7	7.7	88.7	98.3	98.7	104.7	112.3	6.3	6.7	7.0	7.7	7.7	7.1
GRAND PRIX (LCB-103)	5.0	7.0	7.7	4.0	8.0	90.0	99.7	97.3	104.3	108.0	7.3	6.3	7.0	7.3	6.7	7.3
CRENSHAW	6.0	6.7	7.7	5.0	7.7	90.7	102.0	101.7	104.3	108.7	7.3	6.7	7.7	7.0	6.0	7.0
SR 1020	5.3	6.0	7.7	3.7	7.0	91.7	99.3	97.0	104.3	111.0	7.7	5.3	7.0	7.3	6.7	6.9
CATO	6.0	7.0	7.3	4.0	7.3	88.3	99.7	102.3	106.3	109.3	7.0	6.3	6.7	6.7	6.3	6.7
PROVIDENCE	6.0	6.7	7.3	4.3	7.7	91.7	96.3	97.7	102.7	110.3	7.0	6.0	6.7	6.7	6.3	6.7
TRUELINE	6.0	6.7	7.7	4.7	7.0	89.3	97.7	99.3	105.3	112.0	6.3	6.0	6.3	7.3	6.7	6.7
PUTTER	5.0	6.0	7.3	5.7	6.7	90.3	96.7	98.3	100.3	107.3	7.3	6.3	7.0	6.7	5.7	6.6
VIPER	6.0	7.7	7.3	3.7	7.7	89.0	99.7	102.3	105.7	113.0	6.0	6.3	6.3	7.7	6.0	7.3
PENNCROSS	5.3	6.3	6.0	5.3	6.0	92.7	94.7	97.7	98.3	106.0	5.0	5.0	5.7	6.7	7.3	7.0
LSD VALUE	1.2	1.3	1.0	2.1	0.9	10.5	10.7	-	11.4	-	1.8	0.8	1.2	1.0	1.5	2.0
C.V. (%)	10.6	8.8	7.2	19.1	6.8	3.9	4.2	4.9	3.8	5.9	12.9	7.4	8.5	7.1	10.6	8.8

1/ TO DETERMINE STATISTICAL DIFFERENCES AMONG ENTRIES, SUBTRACT ONE ENTRY'S MEAN FROM ANOTHER ENTRY'S MEAN.  
STATISTICAL DIFFERENCES OCCUR WHEN THIS VALUE IS LARGER THAN THE CORRESPONDING LSD VALUE (LSD 0.05).

2/ C.V. (COEFFICIENT OF VARIATION) INDICATES THE PERCENT VARIATION OF THE MEAN IN EACH COLUMN.

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Table 10

MEAN TURFGRASS QUALITY AND OTHER RATINGS OF BENTGRASS CULTIVARS  
IN THE 1997 USGA/GCSAA/NTEP ON-SITE BENTGRASS TEST  
AT BIRMINGHAM, AL (COUNTRY CLUB OF BIRMINGHAM) 1/  
1998 DATA

TURFGRASS QUALITY AND OTHER RATINGS 1-9; 9=BEST  
TURFGRASS STIMPMETER READINGS MEASURED IN INCHES 2/

NAME	COLOR DECEMBER	PERCENT ESTABLISHMENT FALL	QUALITY RATINGS												MEAN			
			QUALITY RATINGS NOV 97		QUALITY RATINGS IN 1998													
			NOV 97	DEC 97	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
PENN A-4	5.3	65.0	6.0	6.7	7.0	7.7	6.0	7.7	8.0	6.7	4.3	4.3	6.0	5.7	5.7	6.3	6.3	6.3
PENN A-1	6.0	43.3	5.3	5.7	5.7	6.0	5.7	7.7	7.0	6.7	4.3	4.7	6.3	7.0	6.3	7.0	6.2	6.2
IMPERIAL	4.0	66.7	6.7	6.0	5.0	5.7	5.0	7.3	5.3	7.0	6.7	6.0	5.0	6.7	5.0	6.7	5.9	5.9
GRAND PRIX (LCB-103)	4.0	63.3	5.7	6.0	6.0	6.0	5.3	7.0	6.0	7.0	5.0	4.7	5.3	6.0	5.3	7.0	5.9	5.9
CRENSHAW	5.3	66.7	6.3	6.7	6.0	6.7	6.0	7.0	5.3	7.0	5.0	4.7	5.0	6.0	5.0	5.7	5.8	5.8
CENTURY	4.3	66.7	6.0	6.3	5.7	7.7	6.7	7.7	6.7	6.7	3.7	3.7	5.0	4.3	4.7	5.0	5.6	5.6
PENN G-1	5.7	56.7	6.7	6.7	6.3	6.0	6.0	7.0	5.7	6.7	3.7	4.0	4.3	5.7	5.0	6.3	5.6	5.6
SR 1020	5.7	65.0	6.0	6.0	5.3	5.7	5.3	7.0	6.0	6.0	4.7	4.3	5.3	5.7	4.3	6.0	5.5	5.5
BACKSPIN	4.7	63.3	5.7	6.0	5.0	5.7	5.3	7.0	5.3	7.0	5.3	4.7	4.3	5.7	4.3	5.0	5.4	5.4
SR 1119	6.7	63.3	6.0	5.7	7.0	6.0	6.0	6.7	6.3	5.7	4.0	4.0	4.0	5.7	4.3	5.7	5.4	5.4
L-93	6.0	63.3	6.0	6.7	6.0	6.3	5.7	7.0	5.7	6.0	3.7	4.0	3.7	4.7	5.0	5.3	5.3	5.3
PENN G-6	5.0	55.0	5.7	6.0	6.3	7.0	6.0	6.7	6.3	6.0	2.3	3.0	3.7	5.0	5.0	4.7	5.2	5.2
PENNCROSS	4.0	63.3	6.3	7.0	7.3	7.3	5.0	5.3	3.3	6.0	4.7	4.7	3.3	4.7	4.0	5.0	5.1	5.1
PUTTER	5.7	71.7	5.3	6.0	5.0	5.0	4.7	6.7	4.7	6.0	4.3	4.7	4.3	6.0	4.7	5.3	5.1	5.1
PROVIDENCE	5.7	58.3	6.0	6.0	5.7	5.3	5.7	6.7	5.3	6.3	3.7	3.7	3.7	4.7	4.0	5.0	5.0	5.0
TRUELINE	5.3	53.3	4.7	6.0	5.0	5.7	4.7	6.0	4.0	6.3	4.3	4.7	3.3	5.0	4.7	5.3	4.9	4.9
VIPER	6.0	66.7	6.0	5.7	5.7	5.3	5.0	7.0	5.3	6.3	3.7	3.3	3.3	4.7	3.7	5.0	4.9	4.9
CATO	4.3	65.0	5.7	5.7	3.7	5.0	5.0	6.3	5.3	5.3	1.3	2.3	3.3	3.3	2.7	3.7	3.9	3.9
LSD VALUE	1.1	25.9	0.8	1.4	4.0	2.4	1.9	0.7	1.0	1.1	1.5	1.0	1.3	1.5	1.4	1.2	0.7	0.7
C.V. (%)	12.8	15.9	7.8	9.5	24.8	17.4	13.9	6.2	11.4	8.4	21.2	14.0	17.6	15.5	16.2	12.8	7.4	7.4

1/ TO DETERMINE STATISTICAL DIFFERENCES AMONG ENTRIES, SUBTRACT ONE ENTRY'S MEAN FROM ANOTHER ENTRY'S MEAN.  
STATISTICAL DIFFERENCES OCCUR WHEN THIS VALUE IS LARGER THAN THE CORRESPONDING LSD VALUE (LSD 0.05).

2/ C.V. (COEFFICIENT OF VARIATION) INDICATES THE PERCENT VARIATION OF THE MEAN IN EACH COLUMN.

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Table 11

MEAN TURFGRASS QUALITY AND OTHER RATINGS OF BENTGRASS CULTIVARS  
IN THE 1997 USGA/GCSAA/NTEP ON-SITE BENTGRASS TEST  
AT RYE, NY (WESTCHESTER COUNTRY CLUB) 1/  
1998 DATA

TURFGRASS QUALITY AND OTHER RATINGS 1-9; 9=BEST 2/

NAME	GENETIC COLOR	GREENUP	LEAF TEXTURE	SEEDLING VIGOR	DENSITY RATINGS		DOLLAR SPOT	QUALITY RATINGS						
					SPRING	SUMMER	FALL	APR	MAY	JUN	JUL	AUG	SEP	NOV
PENN A-4	7.0	7.3	9.0	7.3	7.7	9.0	6.0	7.7	8.7	9.0	8.0	7.7	5.7	8.3
CENTURY	4.0	4.7	8.7	7.0	6.3	8.0	6.3	6.0	8.0	8.0	7.7	7.3	6.0	6.7
PENN A-1	6.7	5.0	8.0	4.0	5.3	8.0	5.0	8.0	8.0	8.0	7.7	7.0	5.3	6.7
PENN G-1	6.3	5.7	7.7	7.0	6.7	7.7	5.7	7.0	8.0	8.0	7.3	6.7	5.7	6.7
SR 1119	7.3	4.3	6.7	5.0	6.0	7.0	4.3	8.3	9.0	8.0	6.3	5.7	5.0	5.7
L-93	7.0	4.3	6.3	5.0	5.3	7.0	5.0	8.7	8.0	7.0	6.7	6.7	5.3	7.0
GRAND PRIX (LCB-103)	3.7	5.3	7.3	8.0	5.3	7.0	5.0	7.7	6.7	7.0	7.0	6.3	5.0	6.2
CRENSHAW	6.0	3.7	6.0	6.3	5.0	6.3	4.7	7.0	8.0	6.7	6.0	6.0	5.0	5.3
PENN G-6	5.7	5.7	6.7	6.7	7.0	7.0	5.0	8.0	7.7	6.7	6.0	6.3	4.7	5.3
BACKSPIN	2.7	3.7	7.7	5.3	4.7	7.3	5.3	6.3	7.3	7.3	7.3	5.7	4.7	6.0
IMPERIAL	3.7	3.7	8.0	7.7	6.0	7.3	4.0	6.3	7.0	7.3	6.3	5.7	4.3	4.7
CATO	6.7	3.0	6.7	4.7	5.0	6.7	3.7	7.7	7.7	7.0	6.3	5.0	4.3	5.3
PROVIDENCE	5.7	4.3	5.7	6.7	5.0	6.0	4.0	8.7	7.3	6.0	6.0	4.7	4.0	5.0
SR 1020	5.0	3.3	6.7	4.3	4.7	6.7	4.7	7.7	6.7	6.3	6.0	5.0	5.0	5.6
VIPER	6.3	3.0	6.0	6.7	7.0	6.3	3.3	8.0	7.7	6.0	5.0	4.0	3.7	5.3
TRUELINE	5.0	4.7	5.7	8.0	5.0	5.7	3.3	7.7	6.3	5.3	5.0	4.0	4.0	5.0
PUTTER	4.7	2.7	5.0	7.3	3.3	5.0	2.7	8.3	5.3	5.0	4.3	3.7	3.0	4.0
PENNCROSS	2.0	3.0	3.0	6.3	2.3	4.0	1.0	8.7	5.7	3.3	3.3	2.0	2.0	2.0
LSD VALUE	1.0	1.9	0.9	1.7	1.4	0.9	1.1	0.9	1.2	0.9	1.0	0.7	1.0	0.9
C.V. (%)	11.9	24.7	8.4	15.9	16.3	8.7	16.1	7.0	9.8	8.5	10.3	9.0	14.1	10.9

1/ TO DETERMINE STATISTICAL DIFFERENCES AMONG ENTRIES, SUBTRACT ONE ENTRY'S MEAN FROM ANOTHER ENTRY'S MEAN. STATISTICAL DIFFERENCES OCCUR WHEN THIS VALUE IS LARGER THAN THE CORRESPONDING LSD VALUE (LSD 0.05).

2/ C.V. (COEFFICIENT OF VARIATION) INDICATES THE PERCENT VARIATION OF THE MEAN IN EACH COLUMN.

9700147

12-9700147

Table 12. Winter purple color ratings. Augusta National Golf Club, Georgia, 1993-1994.

	Average % Winter Purple Color		
	1993	1994	Ave
Penn A-1	12	3	7.5
Penn A-4	6	10	8.0
Penn G-2	3	15	9.0
Penn G-1	15	5	10.0
Penn A-2	2	20	11.0
Seaside II	10	40	25.0
Penncross	25	30	27.5
Cato	30	40	35.0
Penn G-6	40	50	45.0
Crenshaw	60	50	55.0
LSD (0.05)	9.2	12.5	10.2

U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

EXHIBIT E  
STATEMENT OF THE BASIS OF OWNERSHIP

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

## 1. NAME OF APPLICANT(S)

Pennsylvania Agricultural Experiment Station

## 2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER

G-1

## 3. VARIETY NAME

Penn G-1  
Greeping Bentgrass

## 4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)

Charles R. Krueger Bruce McPherson  
Associate Dean  
0217 Agricultural Admin. Bldg.  
University Park, PA 16802

## 5. TELEPHONE (include area code)

814-865-5410

## 6. FAX (include area code)

814-863-7905

## 7. PVPO NUMBER

9700147

## 8. Does the applicant own all rights to the variety? Mark an "X" in appropriate block. If no, please explain.

☒ YES ☐ NO

## 9. Is the applicant (individual or company) a U.S. national or U.S. based company? If no, give name of country

☒ YES ☐ NO

## 10. Is the applicant the original breeder? If no, please answer the following:

☐ YES ☒ NO

## a. If original rights to variety were owned by individual(s):

Is (are) the original breeder(s) a U.S. national(s)? If no, give name of country

☒ YES ☐ NO

## b. If original rights to variety were owned by a company:

Is the original breeder(s) U.S. based company? If no, give name of country

## 11. Additional explanation on ownership (If needed, use reverse for extra space):

J. M. Duich, Professor Turfgrass Science is breeder.  
Employee of applicant with rights assigned to applicant.

## PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original breeder, both the original breeder and the applicant must meet one of the above criteria.

The original breeder may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.

Public reporting burden for this collection of information is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture, Clearance Officer, OIRM, AG Box 7630, Jamie L. Whitten Building, Washington, D.C. 20250. When replying, refer to OMB No. 0581-0055 and form number in your letter.

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